

Seminar über Astrophysik, Sommersemester 2013

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- Termin: ?
- Vortrag: 20 – 25 Minuten, Vortragsfolien werden als Zusammenfassung/Ausarbeitung gewertet
- Lehrbücher
 - Schulz, *The Formation and Early Evolution of Stars*, 2012
 - Bodenheimer, *Principles of Star Formation*, 2011
 - Ward-Thompson & Whitworth, *An Introduction to Star Formation*, 2011
 - Stahler & Palla, *The Formation of Stars*, 2004
 - Bally & Reipurth, *The Birth of Stars and Planets*, 2006
 - Larson, *The physics of star formation*, Report 2003
 - Weigert, Wendker & Wisotzki, *Astronomie und Astrophysik*, 2009
 - Unsöld & Baschek, *Der Neue Kosmos*, 2006
 - Binney & Tremaine, *Galactic Dynamics*, 2008
 - Shu, *The Physics of Astrophysics, II*, 1992
 - Kolb & Turner, *The Early Universe*, 2005
 - Liddle, *Einführung in die moderne Kosmologie*, 2009
 - P. Schneider, *Extragalaktische Astronomie und Kosmologie*, 2007
 - S. Weinberg, *Cosmology*, 2008
- Themen nach Absprache, oder
- Mögliche Themen (Sternentstehung/Galaktische Astrophysik):
 - **Instellare Medium (ISM): Zusammensetzung, Dynamik, Geschichtliches** (Weigert et al., 2009; Breitschwerdt, 1998)
 - **Molekülwolken und Turbulenz** (Ballesteros-Paredes et al., 2007; Ballesteros-Paredes, 2004; Blitz et al., 2007)
 - **Initial Mass Function (IMF)** (Kroupa, 2002; Kroupa & Boily, 2002; Bonnell et al., 2007)
 - **Kollaps von Gasklumpen** (Larson, 1969; Penston, 1969; Shu, 1977; Bonnor, 1956; Ebert, 1955)
 - **Entstehung massereicher Sterne** (Zinnecker & Yorke, 2007; Beuther et al., 2007; McKee & Ostriker, 2007)

- **Magnetfelder (amipolare Diffusion)** (Spitzer, 1998; Mouschovias & Spitzer, 1976)
 - **Gasausflüsse von Protosternen** (Blandford & Payne, 1982; Pudritz & Norman, 1983, 1986)
 - **Eigenschaften und Entwicklung von Sternhaufen** (Weigert et al., 2009; Binney & Tremaine, 2008; Portegies Zwart et al., 2010)
 - **Moderne Teleskope: z.B. ALMA, HERSCHEL Satellitenteleskop, LOFAR, VLT**
- Mögliche Themen (Extragalaktik / Kosmologie):
 - **Entstehung der ersten Sterne** (Bromm et al., 2009; Abel et al., 2002; Glover, 2005)
 - **Extragalaktische Sternentstehung** (Kennicutt-Schmidt Law,... Schneider, 2006)
 - **Dunkle Materie: warum? Evidenz** (Weinberg, 2008; Kolb & Turner, 1994; Schneider, 2006)
 - **Kosmischen Hintergrundstrahlung (CMBR): Entstehung, Fluktuationen** (Weinberg, 2008; Kolb & Turner, 1994; Schneider, 2006; Durrer, 2008)
 - **Entstehung der ersten Elemente: Big-Bang-Nukleosynthese** (Weinberg, 2008; Kolb & Turner, 1994)
 - **Strukturbildung, Entstehung von Galaxien** (Schneider, 2006; Kolb & Turner, 1994; Weinberg, 2008)
 - **Supernovae–Dunkle-Energie Projekte** (The Supernova Cosmology Project, High-Z SN search Team: Perlmutter, 2003; Perlmutter & Schmidt, 2003; Perlmutter, 2005; Riess, 2000)
 - **Inter-/Extragalaktische Magnetfelder**(Neronov & Semikoz, 2009; Neronov & Vovk, 2010; Tavecchio et al., 2010; Taylor et al., 2011)
 - **Gravitationslinsen** (Hartle, 2003; Schneider et al., 1992)
 - **Ergebnisse der ESA PLANCK Mission** (Overview: Planck Collaboration et al., 2013)

References

- Abel, T., Bryan, G. L., & Norman, M. L., The Formation of the First Star in the Universe. 2002, *Science*, 295, 93
- Ballesteros-Paredes, J., Turbulent Fragmentation and Star Formation. 2004, *Ap&SS*, 292, 193
- Ballesteros-Paredes, J., Klessen, R. S., Mac Low, M.-M., & Vazquez-Semadeni, E., Molecular Cloud Turbulence and Star Formation. 2007, in *Protostars and Planets V*, ed. B. Reipurth, D. Jewitt, & K. Keil, 63–80
- Beuther, H., Churchwell, E. B., McKee, C. F., & Tan, J. C., The Formation of Massive Stars. 2007, in *Protostars and Planets V*, ed. B. Reipurth, D. Jewitt, & K. Keil, 165–180
- Binney, J. & Tremaine, S. 2008, *Galactic Dynamics: Second Edition* (Princeton University Press)
- Blandford, R. D. & Payne, D. G., Hydromagnetic flows from accretion discs and the production of radio jets. 1982, *MNRAS*, 199, 883
- Blitz, L., Fukui, Y., Kawamura, A., Leroy, A., Mizuno, N., & Rosolowsky, E., Giant Molecular Clouds in Local Group Galaxies. 2007, *Protostars and Planets V*, 81
- Bonnell, I. A., Larson, R. B., & Zinnecker, H., The Origin of the Initial Mass Function. 2007, in *Protostars and Planets V*, ed. B. Reipurth, D. Jewitt, & K. Keil, 149–164
- Bonnor, W. B., Boyle’s Law and gravitational instability. 1956, *MNRAS*, 116, 351
- Breitschwerdt, D., Introductory Lecture: The Local and General Interstellar Medium. 1998, in *Lecture Notes in Physics*, Berlin Springer Verlag, Vol. 506, IAU Colloq. 166: The Local Bubble and Beyond, ed. D. Breitschwerdt, M. J. Freyberg, & J. Truemper, 5–16
- Bromm, V., Yoshida, N., Hernquist, L., & McKee, C. F., The formation of the first stars and galaxies. 2009, *Nature*, 459, 49
- Durrer, R. 2008, *The Cosmic Microwave Background* (Cambridge Catalogue)
- Ebert, R., Über die Verdichtung von H I-Gebieten. Mit 5 Textabbildungen. 1955, *ZAp*, 37, 217
- Glover, S., The Formation Of The First Stars In The Universe. 2005, *Space Sci. Rev.*, 117, 445
- Hartle, J. B. 2003, *Gravity : an introduction to Einstein’s general relativity* (Addison Wesley, ISBN 0-8053-8662-9, 2003, XXII + 582 pp.)
- Kolb, E. W. & Turner, M. S. 1994, *The early universe*. (Addison-Wesley Publishing Company)

- Kroupa, P., The Initial Mass Function of Stars: Evidence for Uniformity in Variable Systems. 2002, *Science*, 295, 82
- Kroupa, P. & Boily, C. M., On the mass function of star clusters. 2002, *MNRAS*, 336, 1188
- Larson, R. B., Numerical calculations of the dynamics of collapsing proto-star. 1969, *MNRAS*, 145, 271
- McKee, C. F. & Ostriker, E. C., Theory of Star Formation. 2007, *ARA&A*, 45, 565
- Mouschovias, T. C. & Spitzer, Jr., L., Note on the collapse of magnetic interstellar clouds. 1976, *ApJ*, 210, 326
- Neronov, A. & Semikoz, D. V., Sensitivity of γ -ray telescopes for detection of magnetic fields in the intergalactic medium. 2009, *Phys. Rev. D*, 80, 123012
- Neronov, A. & Vovk, I., Evidence for Strong Extragalactic Magnetic Fields from Fermi Observations of TeV Blazars. 2010, *Science*, 328, 73
- Penston, M. V., Dynamics of self-gravitating gaseous spheres-II. Collapses of gas spheres with cooling and the behaviour of polytropic gas spheres. 1969, *MNRAS*, 145, 457
- Perlmutter, S., Supernovae, Dark Energy, and the Accelerating Universe. 2003, *Physics Today*, 56, 040000
- , Studying Dark Energy with Supernovae: Now, Soon, and the Not-Too-Distant Future. 2005, *Physica Scripta Volume T*, 117, 17
- Perlmutter, S. & Schmidt, B. P., Measuring Cosmology with Supernovae. 2003, in *Lecture Notes in Physics*, Berlin Springer Verlag, Vol. 598, Supernovae and Gamma-Ray Bursters, ed. K. Weiler, 195–217
- Planck Collaboration, Ade, P. A. R., Aghanim, N., Armitage-Caplan, C., Arnaud, M., Ashdown, M., Atrio-Barandela, F., Aumont, J., Baccigalupi, C., Banday, A. J., & et al., Planck 2013 results. I. Overview of products and scientific results. 2013, *ArXiv e-prints*: 1303.5062
- Portegies Zwart, S. F., McMillan, S. L. W., & Gieles, M., Young Massive Star Clusters. 2010, *ARA&A*, 48, 431
- Pudritz, R. E. & Norman, C. A., Centrifugally driven winds from contracting molecular disks. 1983, *ApJ*, 274, 677
- , Bipolar hydromagnetic winds from disks around protostellar objects. 1986, *ApJ*, 301, 571
- Riess, A. G., The Case for an Accelerating Universe from Supernovae. 2000, *PASP*, 112, 1284

- Schneider, P. 2006, Einführung in die extragalaktische Astronomie und Kosmologie (Berlin: Springer)
- Schneider, P., Ehlers, J., & Falco, E. E. 1992, Gravitational Lenses (Springer-Verlag Berlin Heidelberg New York. Also Astronomy and Astrophysics Library)
- Shu, F. H., Self-similar collapse of isothermal spheres and star formation. 1977, ApJ, 214, 488
- Spitzer, L. 1998, Physical Processes in the Interstellar Medium (pp. 335. ISBN 0-471-29335-0. Wiley-VCH)
- Tavecchio, F., Ghisellini, G., Foschini, L., Bonnoli, G., Ghirlanda, G., & Coppi, P., The intergalactic magnetic field constrained by Fermi/Large Area Telescope observations of the TeV blazar 1ES0229+200. 2010, MNRAS, 406, L70
- Taylor, A. M., Vovk, I., & Neronov, A., Extragalactic magnetic fields constraints from simultaneous GeV-TeV observations of blazars. 2011, A&A, 529, A144+
- Weigert, A., Wendker, H. J., & Wisotzki, L. 2009, Astronomie und Astrophysik (Wiley-VCH 2009)
- Weinberg, S. 2008, Cosmology (Oxford University Press)
- Zinnecker, H. & Yorke, H. W., Toward Understanding Massive Star Formation. 2007, ARA&A, 45, 481